Pine Chemicals Association
September 2004

VII. Robust Summaries of Data for Rosins and Rosin Salts

PHYSICO-CHEMICAL PROPERTY – WATER SOLUBILITY	
Test Substance	
Chemical Name	Rosin
CAS #	8050-09-7
Method	
Method/Guideline followed	Testing was conducted according to OECD Test Method 105, *Water Solubility*
Test Type	Water solubility
GLP (Y/N)	Y
Year (Study Performed)	2003
Test conditions	Rosin was tested for water solubility by weighing 0.5 g of the test item into an Erlenmeyer flask and adding 150 ml of Milli-Q water. Samples were prepared in triplicate. The flasks were then shaken orbitally at 150 r.p.m. at 30 °C ± °C for 72 h. A Milli-Q water blank was prepared in the same manner, without test material. At the end of the shaking period, the flasks were transferred to a water bath at 20 °C ± °C for 24 h. The pH of the water was recorded prior to addition of the test material and at the end of the incubation period. The samples were then filtered if appropriate to remove undissolved material and allowed to sit overnight at ambient laboratory temperature. 100 ml of the clear supernatant/filtrate was then adjusted to pH 2 with phosphoric acid and extracted using preconditioned solid phase extraction cartridges, evaporated to residue, reconstituted in an internal standard solution, sonicated in an ultrasonic bath and derivatized with trimethylphenylammonium hydroxide (TMPAH). The test samples were then assayed by gas chromatography (GC) using flame ionization detection (FID). Arachidic acid methyl ester was used as the internal standard.
Results	The water solubility of rosin is 0.9 mg/l at 20 °C.
Data Quality	Reliable without restrictions – Klimisch Code 1a
References	Dinwoodie, N.B. 2003. Determination of the Water Solubility of Rosins, Rosin Salts, Rosin Adducts, Adduct Salts and Rosin Esters Report No. 24028, Inveresk Research, Tranent, Scotland.

PHYSICO-CHEMICAL PROPERTY – WATER SOLUBILITY	
Test Substance	
Chemical Name	Rosin, hydrogenated
CAS #	65997-06-0
Method	
Method/Guideline followed	Testing was conducted according to OECD Test Method 105, *Water Solubility*
Test Type	Water solubility

GLP (Y/N)	Y
Year (Study Performed)	2003
Test conditions	Rosin, hydrogenated was tested for water solubility by weighing 0.5 g of the test item into an Erlenmeyer flask and adding 150 ml of Milli-Q water. Samples were prepared in triplicate. The flasks were then shaken orbitally at 150 r.p.m. at 30 ^{o}C ± ^{o}C for 72 h. A Milli-Q water blank was prepared in the same manner, without test material. At the end of the shaking period, the flasks were transferred to a water bath at 20 ^{o}C ± ^{o}C for 24 h. The pH of the water was recorded prior to addition of the test material and at the end of the incubation period. The samples were then filtered if appropriate to remove undissolved material and allowed to sit overnight at ambient laboratory temperature. 100 ml of the clear supernatant/filtrate was then adjusted to pH 2 with phosphoric acid and extracted using preconditioned solid phase extraction cartridges, evaporated to residue, reconstituted in an internal standard solution, sonicated in an ultrasonic bath and derivatized with trimethylphenylammonium hydroxide (TMPAH). The test samples were then assayed by gas chromatography (GC) using flame ionization detection (FID). Arachidic acid methyl ester was used as the internal standard.
Results	The water solubility of rosin, hydrogenated is 1.18 mg/l at 20 ^{0}C.
Data Quality	Reliable without restrictions – Klimisch Code 1a
References	Dinwoodie, N.B. 2003. Determination of the Water Solubility of Rosins, Rosin Salts, Rosin Adducts, Adduct Salts and Rosin Esters Report No. 24028, Inveresk Research, Tranent, Scotland.

PHYSICO-CHEMICAL PROPERTY – WATER SOLUBILITY	
Test Substance	
Chemical Name	Rosin, distillation overheads
CAS #	68425-08-1
Method	
Method/Guideline followed	Testing was conducted according to OECD Test Method 105, *Water Solubility*
Test Type	Water solubility
GLP (Y/N)	Y
Year (Study Performed)	2003
Test conditions	Rosin, distillation overheads was tested for water solubility by weighing 0.5 g of the test item into an Erlenmeyer flask and adding 150 ml of Milli-Q water. Samples were prepared in triplicate. The flasks were then shaken orbitally at 150 r.p.m. at 30 ^{o}C ± ^{o}C for 72 h. A Milli-Q water blank was prepared in the same manner, without test material. At the end of the shaking period, the flasks were transferred to a water bath at 20 ^{o}C ± ^{o}C for 24 h. The pH of the water was recorded prior to addition of the test material and at the end of the incubation period. The samples were then filtered if appropriate to remove undissolved material and allowed to sit overnight at ambient laboratory temperature. 100 ml of the clear supernatant/filtrate was then adjusted to pH 2 with phosphoric acid and extracted using preconditioned solid phase extraction cartridges, evaporated to residue, reconstituted in an internal standard solution, sonicated in an ultrasonic bath

	and derivatized with trimethylphenylammonium hydroxide (TMPAH). The test samples were then assayed by gas chromatography (GC) using flame ionization detection (FID). Arachidic acid methyl ester was used as the internal standard.
Results	The water solubility of rosin, distillation overheads is 19.85 mg/l at 20 ^{0}C.
Data Quality	Reliable without restrictions – Klimisch Code 1a
References	Dinwoodie, N.B. 2003. Determination of the Water Solubility of Rosins, Rosin Salts, Rosin Adducts, Adduct Salts and Rosin Esters Report No. 24028, Inveresk Research, Tranent, Scotland.

PHYSICO-CHEMICAL PROPERTY – OCTANOL/WATER PARTITION COEFFICIENT	
Test Substance	
Chemical Name	Tall oil rosin
CAS #	8050-09-7
Method	
Method/Guideline followed	Testing was conducted according to OECD Test Method 117, *"Partition Coefficient (n-Octanol/Water) High Performance Liquid Chromatograph (HPLC) Method"*
Test Type	Partition coefficient
GLP (Y/N)	Y
Year (Study Performed)	1993
Test conditions	Tall oil rosin was dissolved in methanol and the solution was analyzed by HPLC with UV detection using a mobile phase of methanol:buffer (3:1) at pH 2 and pH 7.5. As a reference substance, a mixture of seven materials was used.
Results	At pH 2, the log P_{ow} [K_{ow}] values of five components in tall oil rosin were 4.5, 6.1, 6.9, 7.1, and 7.2. At pH 7.5, the log P_{ow} value of one component in tall oil rosin was 3.6.
Data Quality	Reliable without restrictions – Klimisch Code 1a
References	Dybdahl, H.P. 1993. Determination of log P_{ow} for single components in tall oil rosin. GLP Study No. 408335/471. Water Quality Institute, Horshølm, Denmark.

PHYSICO-CHEMICAL PROPERTY – OCTANOL/WATER PARTITION COEFFICIENT	
Test Substance	
Chemical Name	Rosin
CAS #	8050-09-7
Method	
Method/Guideline followed	Testing was conducted according to OECD Test Method 117, *"Partition Coefficient (n-Octanol/Water) High Performance Liquid Chromatograph (HPLC) Method"*
Test Type	Partition coefficient
GLP (Y/N)	Y
Year (Study Performed)	2003
Test conditions	Rosin and reference materials were dissolved in methanol and the solutions were analyzed in duplicate by HPLC with Refractive Index (RI) and Photodiode Array (PDA) detection using a mobile phase of 25:75 (v/v) Milli-Q water/methanol at pH 2. A mixture of seven materials with known log P_{ow} values was used for reference.

Results	At pH 2, rosin had a partition coefficient range of 1.9 to 7.7.
Data Quality	Reliable without restrictions – Klimisch Code 1a
Reference	Lightbody, S.M., Fisher, K. and Dinwoodie, N.B. 2003. Determination of the Partition Coefficient of Rosins, Rosin Salts, Rosin Adducts, Adduct Salts and Rosin Esters. Report No. 20977. Inveresk Research, Tranent, Scotland.

PHYSICO-CHEMICAL PROPERTY – OCTANOL/WATER PARTITION COEFFICIENT	
Test Substance	
Chemical Name	Rosin, hydrogenated
CAS #	65997-06-0
Method	
Method/Guideline followed	Testing was conducted according to OECD Test Method 117, *"Partition Coefficient (n-Octanol/Water) High Performance Liquid Chromatograph (HPLC) Method"*
Test Type	Partition coefficient
GLP (Y/N)	Y
Year (Study Performed)	2003
Test conditions	Rosin, hydrogenated and reference materials were dissolved in methanol and the solutions were analyzed in duplicate by HPLC with Refractive Index (RI) and Photodiode Array (PDA) detection using a mobile phase of 25:75 (v/v) Milli-Q water/methanol at pH 2. A mixture of seven materials with known log P_{ow} values was used for reference.
Results	At pH 2, rosin, hydrogenated had a partition coefficient range of 2.5 to 7.6.
Data Quality	Reliable without restrictions – Klimisch Code 1a
Reference	Lightbody, S.M., Fisher, K. and Dinwoodie, N.B. 2003. Determination of the Partition Coefficient of Rosins, Rosin Salts, Rosin Adducts, Adduct Salts and Rosin Esters. Report No. 20977. Inveresk Research, Tranent, Scotland.

PHYSICO-CHEMICAL PROPERTY – OCTANOL/WATER PARTITION COEFFICIENT	
Test Substance	
Chemical Name	Rosin, distillation overheads
CAS #	68425-08-1
Method	
Method/Guideline followed	Testing was conducted according to OECD Test Method 117, *"Partition Coefficient (n-Octanol/Water) High Performance Liquid Chromatograph (HPLC) Method"*
Test Type	Partition coefficient
GLP (Y/N)	Y
Year (Study Performed)	2003
Test conditions	Rosin, distillation overheads and reference materials were dissolved in methanol and the solutions were analyzed in duplicate by HPLC with Refractive Index (RI) and Photodiode Array (PDA) detection using a mobile phase of 25:75 (v/v) Milli-Q water/methanol at pH 2. A mixture of seven materials with known log P_{ow} values was used for reference.

Results	At pH 2, rosin, distillation overheads had a partition coefficient range of 2.5 to 7.8.
Data Quality	Reliable without restrictions – Klimisch Code 1a
Reference	Lightbody, S.M., Fisher, K. and Dinwoodie, N.B. 2003. Determination of the Partition Coefficient of Rosins, Rosin Salts, Rosin Adducts, Adduct Salts and Rosin Esters. Report No. 20977. Inveresk Research, Tranent, Scotland.

PHYSICO-CHEMICAL PROPERTY – OCTANOL/WATER PARTITION COEFFICIENT	
Test Substance	
Chemical Name	Rosin, potassium salt
CAS #	61790-50-9
Method	
Method/Guideline followed	Testing was conducted according to OECD Test Method 117, *"Partition Coefficient (n-Octanol/Water) High Performance Liquid Chromatograph (HPLC) Method"*
Test Type	Partition coefficient
GLP (Y/N)	Y
Year (Study Performed)	2003
Test conditions	Rosin, potassium salt and reference materials were dissolved in methanol and the solutions were analyzed in duplicate by HPLC with Refractive Index (RI) and Photodiode Array (PDA) detection using a mobile phase of 25:75 (v/v) Milli-Q water/methanol at pH 2. A mixture of seven materials with known log P_{ow} values was used for reference.
Results	At pH 2, rosin, potassium salt had a partition coefficient range of 3.0 to 7.0.
Data Quality	Reliable without restrictions – Klimisch Code 1a
Reference	Lightbody, S.M., Fisher, K. and Dinwoodie, N.B. 2003. Determination of the Partition Coefficient of Rosins, Rosin Salts, Rosin Adducts, Adduct Salts and Rosin Esters. Report No. 20977. Inveresk Research, Tranent, Scotland.

PHYSICO-CHEMICAL PROPERTY – OCTANOL/WATER PARTITION COEFFICIENT	
Test Substance	
Chemical Name	Rosin, sodium salt
CAS #	61790-51-0
Method	
Method/Guideline followed	Testing was conducted according to OECD Test Method 117, *"Partition Coefficient (n-Octanol/Water) High Performance Liquid Chromatograph (HPLC) Method"*
Test Type	Partition coefficient
GLP (Y/N)	Y
Year (Study Performed)	2003
Test conditions	Rosin, sodium salt and reference materials were dissolved in methanol and the solutions were analyzed in duplicate by HPLC with Refractive Index (RI) and Photodiode Array (PDA) detection using a mobile phase of 25:75 (v/v) Milli-Q water/methanol at pH 2. A mixture of seven materials with known log P_{ow} values was used for reference.

Results	At pH 2, rosin, sodium salt had a partition coefficient range of 3.5 to 6.6.
Data Quality	Reliable without restrictions – Klimisch Code 1a
Reference	Lightbody, S.M., Fisher, K. and Dinwoodie, N.B. 2003. Determination of the Partition Coefficient of Rosins, Rosin Salts, Rosin Adducts, Adduct Salts and Rosin Esters. Report No. 20977. Inveresk Research, Tranent, Scotland.

ENVIRONMENTAL FATE – BIODEGRADATION	
Test Substance	
Chemical Name	Tall oil rosin
CAS #	8050-09-7
Method	
Method/Guideline followed	Testing was conducted according to OECD Test Method 301 D, *"Ready Biodegradability: Closed Bottle Test"*
Test Type (aerobic/anaerobic)	Aerobic
GLP (Y/N)	Y
Year (Study Performed)	1993
Contact time	28 days
Inoculum	Secondary effluent from Rungsted Treatment plant
Test conditions	Inoculum: Secondary effluent was collected from Rungsted Treatment plant. Concentration of test chemical: A stock solution of the test material (2 g/L) was prepared in demineralized water by ultra sonication for 5 minutes and magnetic stirring for 24 hours at 20°C. The solution was filtered and after determination of the chemical oxygen demand was used within 1 day. Test Setup: Test medium was prepared by adding 1 mL each of four solutions (potassium phosphate, magnesium sulfate, calcium chloride, ferric chloride) to 1 liter of demineralized water, which was aerated to an initial oxygen concentration of approximately 9 mg O_2/L and inoculated with 1 drop of secondary effluent per liter. The test article was added at 0.21 g/L to a part of the inoculated test medium, equivalent to a chemical oxygen demand of 4.52 mg O_2/L. Sodium benzoate, the reference compound, was added at 2 mg/L to another part of the inoculated medium (to assess the activity of the inoculum), equivalent to a theoretical oxygen demand of 3.34 mg O_2/L. Both the test and reference articles (0.21 g/L and 2 mg/L) were added to a third part of the inoculated medium (to assess possible inhibitory effects of the test article), at a theoretical oxygen demand of 7.86 mg O_2/L. Blank controls were prepared using the inoculated medium without test or reference materials. After the samples were prepared, the medium was transferred to calibrated respirometric bottles (BOD bottles), and placed in the dark at 20^{o}C. The study was performed in triplicate. Sampling frequency: Samples were collected for BOD analysis

	on days 0, 7, 14, 21, and 28. Controls: Yes. Method of calculating oxygen demand: Oxygen demand was calculated as the difference between the measured oxygen concentrations at time t and the start of the test. Biological oxygen demand for the added carbon sources was calculated by subtracting the oxygen demand for the blank controls from the oxygen demand in the bottles containing test and reference compounds.
Results	
Degradation % after time	23% after 7 days and 32% after 28 days (test article); 59% after 7 days and 88% after 28 days (sodium benzoate)
Conclusions	The biological oxygen demand for tall oil rosin was 23 and 32% of the theoretical oxygen demand after 7 and 28 days, respectively. These data indicate that the material is dominated by recalcitrant compounds. Tall oil rosin did not inhibit the respiratory activity of the inoculum. The inoculum had satisfactory activity as demonstrated by 60% degradation within the 7 days using the reference compound.
Data Quality	Reliable without restrictions– Klimisch Code 1a
Reference	Madsen, T. 1993. Biodegradation of tall oil rosin. GLP Study No. 308067/471. Water Quality Institute, Horshølm, Denmark.

ENVIRONMENTAL FATE – BIODEGRADATION	
Test Substance	
Chemical Name	Rosin, hydrogenated
CAS #	65997-06-0
Method	
Method/Guideline followed	Testing was conducted according to OECD (1992) 301B *Modified Sturm Test*
Test Type (aerobic/anaerobic)	Aerobic
GLP (Y/N)	Y
Year (Study Performed)	2002
Contact time	28 days
Inoculum	Activated sludge from the Haddington Municipal Sewage Treatment Works
Test conditions	Inoculum: Activated sludge microorganisms were obtained from the Haddington Municipal Sewage Treatment Works. The solids content of the sludge was 3.2 g/l. Concentration of test chemical: The test material was used at a concentration of 20 mg DOC/L. Based on the percentage carbon content, a target weight of 51.31 mg of test material was weighed for direct addition to each appropriate bioreactor. Test Setup: Each test item bioreactor contained 1980 ml of mineral media, 20 ml of microbial inoculum and 54 mg of test item. The reference bioreactor contained 1911 ml of mineral media, 20 ml of microbial inoculum and 69 ml of reference

	material (sodium benzoate) stock. The control bioreactors each contained 1980 ml of mineral media and 20 ml of microbial inoculum. The toxicity control bioreactor contained 1911 ml of mineral media, 20 ml of microbial inoculum, 53.9 mg of test item and 69 ml reference material stock. Each bioreactor was connected to three traps, each trap containing 100 ml of 0.0125 M $Ba(OH)_2$. At trap collection, the trap closes to the bioreactor was taken for titration, the two remaining traps were moved closer to the bioreactor and a fresh trap was placed third in line from the bioreactor. Trap changes were conducted on days 1, 4, 6, 8, 11, 15, 18, 21, 25, and 29. Each sampled trap was titrated with a few drops of phenolphthalein indicator against 0.05M HCl. The pH was determined in each bioreactor on days 0, 28 and 29; if necessary, the pH on day 0 was adjusted to 7.2-7.8. Calculation of Results: The weight of CO_2 evolved was calculated from the titre. The actual titre for each batch of $Ba(OH)_2$ was used as the background titre. The mean titre for the test, reference and control vessels was calculated according to the following equation: Weight CO_2 produced (mg) = 1.1 x (background titre – ml HCl titrated) The net CO_2 production was then calculated by subtracting the control mean CO_2 production from the test and reference material mean CO_2 production values. The percentage biodegradation was calculated by comparing actual CO_2 evolved in test and reference vessels with the theoretical CO_2 evolution. For the test item this was calculated using the DOC addition rate: $\% \text{ degradation} = \frac{\text{Mg } CO_2 \text{ produced}}{\text{mg DOC added} \times 3.67^{*}} \times 100$ * = where 3.67 is the conversion factor (44/12) for carbon to CO_2
Results Degradation % after time	0.95% after 29 days (test article); 75.56% after 28 days (sodium benzoate)
Conclusions	The test article was degraded <1 % after 28 days. Under the conditions of the OECD guidelines, it cannot be considered to be readily biodegradable.
Data Quality	Reliable without restrictions– Klimisch Code 1a
Reference	Kelly, C.R. 2002. Rosin, hydrogenated, CAS No. 65997-06-0 Rosin, distillation overheads, CAS No. 68425-08-1. Determination of Ready Biodegradability by the Modified Sturm Test. Report No. 21215. Inveresk Research, Tranet, Scotland.

ENVIRONMENTAL FATE – BIODEGRADATION	
Test Substance	
Chemical Name	Rosin, distillation overheads
CAS #	68425-08-1
Method	
Method/Guideline followed	Testing was conducted according to OECD (1992) 301B *Modified Sturm Test*
Test Type (aerobic/anaerobic)	Aerobic
GLP (Y/N)	Y
Year (Study Performed)	2002
Contact time	28 days
Inoculum	Activated sludge from the Haddington Municipal Sewage Treatment Works
Test conditions	Inoculum: Activated sludge microorganisms were obtained from the Haddington Municipal Sewage Treatment Works. The solids content of the sludge was 3.2 g/l. Concentration of test chemical: The test material was used at a concentration of 20 mg DOC/L. Based on the percentage carbon content, a target weight of 49.5 mg of test material was weighed for direct addition to each appropriate bioreactor. Test Setup: Each test item bioreactor contained 1980 ml of mineral media, 20 ml of microbial inoculum and 54 mg of test item. The reference bioreactor contained 1911 ml of mineral media, 20 ml of microbial inoculum and 69 ml of reference material (sodium benzoate) stock. The control bioreactors each contained 1980 ml of mineral media and 20 ml of microbial inoculum. The toxicity control bioreactor contained 1911 ml of mineral media, 20 ml of microbial inoculum, 53.9 mg of test item and 69 ml reference material stock. Each bioreactor was connected to three traps, each trap containing 100 ml of 0.0125 M $Ba(OH)_2$. At trap collection, the trap closes to the bioreactor was taken for titration, the two remaining traps were moved closer to the bioreactor and a fresh trap was placed third in line from the bioreactor. Trap changes were conducted on days 1, 4, 6, 8, 11, 15, 18, 21, 25, and 29. Each sampled trap was titrated with a few drops of phenolphthalein indicator against 0.05M HCl. The pH was determined in each bioreactor on days 0, 28 and 29; if necessary, the pH on day 0 was adjusted to 7.2-7.8. Calculation of Results: The weight of CO_2 evolved was calculated from the titre. The actual titre for each batch of $Ba(OH)_2$ was used as the background titre. The mean titre for the test, reference and control vessels was calculated according to the following equation: Weight CO_2 produced (mg) = 1.1 x (background titre – ml HCl titrated)

	The net CO_2 production was then calculated by subtracting the control mean CO_2 production from the test and reference material mean CO_2 production values. The percentage biodegradation was calculated by comparing actual CO_2 evolved in test and reference vessels with the theoretical CO_2 evolution. For the test item this was calculated using the DOC addition rate: $\% \text{ degradation} = \frac{\text{Mg } CO_2 \text{ produced}}{\text{mg DOC added} \times 3.67^{*}} \times 100$ * = where 3.67 is the conversion factor (44/12) for carbon to CO_2
Results Degradation % after time	30.11% after 29 days (test article); 75.56% after 28 days (sodium benzoate)
Conclusions	The test article was degraded 30 % after 28 days. Under the conditions of the OECD guidelines, it cannot be considered to be readily biodegradable although a substantial proportion of the test item had degraded by the end of the test.
Data Quality	Reliable without restrictions– Klimisch Code 1a
Reference	Kelly, C.R. 2002. Rosin, hydrogenated, CAS No. 65997-06-0 Rosin, distillation overheads, CAS No. 68425-08-1. Determination of Ready Biodegradability by the Modified Sturm Test. Report No. 21215. Inveresk Research, Tranet, Scotland.

ENVIRONMENTAL FATE – BIODEGRADATION	
Test Substance	
Chemical Name	Rosin, potassium salt
CAS #	61790-50-9
Method	
Method/Guideline followed	Testing was conducted according to OECD (1992) 302B *"Modified Zahn-Wellens Test"*
Test Type (aerobic/anaerobic)	Aerobic
GLP (Y/N)	Y
Year (Study Performed)	2002
Contact time	28 days
Inoculum	Activated sludge from the Haddington Municipal Sewage Treatment Works
Test conditions	Inoculum: Activated sludge microorganisms were obtained from the Haddington Municipal Sewage Treatment Works. The solids content of the sludge was 4.0 g/l. Concentration of test chemical: The test material was used at a concentration of 200 mg DOC/L equivalent to 1272 mg of rosin, potassium salt per 2.5 liter bioreactor based on percentage total carbon content. To prepare the reference material (aniline) 8.09 ml was added to 1000 ml DI water and sonicated for *ca* 30 min. to aid dissolution; from this stock 125 ml aliquots were added to each appropriate bioreactor at 400 mg/DOC/l equivalent to 125 ml of a 6400 mg/DOC/l solution per 2 liter bioreactor.

	Test Setup: The activated sludge was introduced to the test system at a ratio of 2.5:1 sludge solids/l to test item DOC/l which required the addition of 250 ml of 4 g/l sludge to each bioreactor. A total of six bioreactors were used. Each bioreactor had a final volume of 2000 ml; the control bioreactors each contained 250 ml sludge and 1750 ml of mineral medium; the reference bioreactor contained 250 ml sludge, 125 ml of aniline stock solution and 1625 of mineral medium; the test item bioreactors each contained 250 ml sludge, the appropriate weight of test item and 1750 ml of mineral medium; the toxicity control bioreactor contained 250 ml sludge, the appropriate weight of test item, 125 ml aniline stock and 1625 ml mineral medium. The test was conducted over 28 days. DOC measurements were conducted on duplicate samples 3 h after test initiation, and on Days 14 and 28. Sampling Procedure: Prior to each sampling point the liquid in each vessel was replenished to its starting level. The pH and dissolved oxygen concentration were recorded. If necessary the pH was adjusted to 6.5-8.0 using H_2SO_4 as appropriate. A *ca* 25 ml sample was extracted from each vessel using a syringe and allowed to settle after which it was passed through a 0.45um filter for DOC analysis. Determination of DOC, total organic carbon (TOC), total carbon (TC) and inorganic carbon (IC) were determined. Calculation of Results: All measurements were conducted on duplicate samples. Dissolved organic carbon (DOC) values were calculated as follows: DOC = TC – IC The percentage degradation (Dt) at each timepoint was calculated using mean DOC measurements from the duplicate samples, using the following equation: $$Dt = \left(1 - \frac{Ct - Cb}{Ca - Cba}\right) \times 100$$ Where: Ct = mean DOC concentration in test/reference at time t Cb = mean DOC concentration in controls at time t Ca = mean DOC concentration in test/reference at 3 h ± 0.5 h Cba = mean DOC concentration in controls at 3 h ± 0.5 h
Results Degradation % after time	Rosin, potassium salt reached 89.5 % degradation by Day 28; the reference material reached 98.6% degradation by Day 14. Based on total carbon content this was equivalent to 73.3% of the whole test item.
Conclusions	The test article was degraded 89.5% after 28 days under the conditions of the test.

Data Quality	Reliable without restrictions– Klimisch Code 1a
Reference	Kelly, C.R. 2002. Rosin, potassium salt CAS No. 61790-50-9; Rosin, fumarated, sodium salt, CAS No. 68201-59-2; Rosin, fumarated, potassium salt, CAS No. 68649-83-2; Rosin, maleated, potassium salt, CAS No. 85409-27-4, Determination of Inherent Biodegradability by the Modified Zahn-Wellens Test. Report No. 21487. Inveresk Research, Tranent, Scotland.

ENVIRONMENTAL FATE – BIODEGRADATION	
Test Substance	
Chemical Name	Rosin, sodium salt
CAS #	61790-51-0
Method	
Method/Guideline followed	Testing was conducted using the Shake Flask method similar to OECD Test Method 307.
Test Type (aerobic/anaerobic)	Aerobic
GLP (Y/N)	N
Year (Study Performed)	1965
Contact time	32 days
Inoculum	Activated sludge from the Bergen County Sewage Authority treatment plant in Little Ferry, N.J.
Test conditions	Inoculum: Activated sludge from the Bergen County Sewage Authority treatment plant in Little Ferry, N.J. Concentrations of test and reference chemicals: The test and reference chemicals were used at a concentration of 50 ppm. Test Setup: Test medium consisted of magnesium nitrate, calcium nitrate, ferric nitrate, calcium nitrate, cobaltous chloride, diammonium hydrogen phosphate, dipotassium hydrogen phosphate, and monopotassium hydrogen phosphate all dissolved in distilled water. A blank unit (containing all nutrients except the test materials) was treated in the same manner. Microbial cultures were added at a concentration of 10 mg/l on a dry-weight bases to begin the tests. All solutions were placed in Erlenmeyer flasks that were mounted on a shaker for aeration. The study was performed in triplicate. Sampling frequency: Samples were collected for determination of chemical oxygen demand (COD) on an almost daily basis. Controls: Yes. Linear alkylbenzene sulfonate (LAS) Method of calculating chemical oxygen demand: COD was calculated as the difference between the measured oxygen concentrations at various sampling times and the start of the test. COD for the samples was calculated by subtracting the COD for the blank controls from the COD in the flasks containing test and reference compounds.
Results	

Degradation % after time	70-80% after 21 days (test article) and 97% after 21 days (reference compound)
Conclusions	These data indicate that the sodium salt of rosin is readily biodegradable.
Data Quality	Reliable with restrictions– Klimisch Code 2e
Reference	Eldib, I.A. 1965. Biodegradability evaluation of (trade name deleted [rosin, sodium salt]. Eldib Engineering and Research, Newark, N.J.

ECOTOXICITY – ACUTE TOXICITY TO FISH	
Test substance	
Chemical Name	Rosin
CAS #	8050-09-7
Method	
Method/Guideline followed	OECD Test Method 203, *"Testing of Chemicals, Fish Acute Toxicity Test"* and following procedures in OECD (2000) Series on Testing and Assessment, No. 23, *"Guidance Document on Aquatic Toxicity Testing of Difficult Substances and Mixtures."*
Year	2002
GLP (Y/N)	Y
System of testing	Fathead minnows (*Pimephales promelas)* under static conditions.
Concentration	0, 1, 10, 100 and 1000 mg/l
Results	The 96 hr LL_{50} was > 1000 mg/l the highest loading rate tested. The No Observed Effect Loading Rate ($NOEL_r$) was 1000 mg/l.
Detailed Summary	Rosin was tested in fathead minnows under static conditions to determine the acute toxicity. Water accommodated fractions (WAF) were prepared using the same conditions as those used to determine the water solubility of this substance. Appropriate weights of rosin were added to a stirring medium in glass vessels which were sealed to avoid loss of volatile fractions. Using magnetic stirrers, the stirring speed was adjusted to give a stirring vortex 5-10% of the water column. After a stirring period of approximately 48 hr. the test solutions were allowed to settle for ca hour. The WAF was then removed via a glass siphon taking care not to remove undissolved material at the top of bottom of the water column. The test organisms were exposed to this WAF. This procedure was adopted to maximize the solubility of the test item under specific test exposure conditions, but to reduce exposure to the test organisms to insoluble fractions. A control medium without the addition of the test item was stirred and extracted in an identical ways as the treated media. The effects of both filtering and adjusting pH were investigated in a range finding test using the highest loading rate (i.e., 1000 mg/l). Because no mortality or other effects were observed in the range finding tests, a definitive-limit test was conducted at the maximum loading rate of 1000 mg/l. The 96 hr LL_{50} was > 1000 mg/l, the highest loading rate tested. The No Observed Effect Loading Rate ($NOEL_r$) was 1000 mg/l.
Data Quality	Valid without restriction – Klimisch Code 1a
Reference	Kelly, C. 2002. Rosin, CAS No. 8050-09-7 Determination of Acute Toxicity (LL_{50}) to Fathead Minnows (96 h, Static). Report Number 20545. Inveresk Research, Tranent, Scotland.

ECOTOXICITY – ACUTE TOXICITY TO DAPHNIA	
Test substance	
Chemical Name	Rosin
CAS #	8050-09-7
Method	
Method/Guideline followed	OECD Test Method 202, Part 1 *"Testing of Chemicals, Daphnia sp. Acute Immobilization Test"* and following procedures in OECD (2000) Series on Testing and Assessment, No. 23, *"Guidance Document on Aquatic Toxicity Testing of Difficult Substances and Mixtures."*
Year	2002
GLP (Y/N)	Y
System of testing	*Daphnia magna* (water fleas) under static conditions.
Concentration	0, 125, 250, 500 and 1000 mg/l
Results	The 48 hr EL_{50} was 911 mg/l; the No Observed Effect Loading Rate ($NOEL_r$) was 750 mg/l.
Detailed Summary	Rosin was tested in daphnia under static conditions to determine the acute toxicity. Water accommodated fractions (WAF) were prepared using the same conditions as those used to determine the water solubility of this substance. Appropriate weights of rosin were added to a stirring medium in glass vessels which were sealed to avoid loss of volatile fractions. Using magnetic stirrers, the stirring speed was adjusted to give a stirring vortex 5-10% of the water column. After a stirring period of approximately 48 hr. the test solutions were allowed to settle for ca hour. The WAF was then removed via a glass siphon taking care not to remove undissolved material at the top of bottom of the water column. The test organisms were exposed to this WAF. This procedure was adopted to maximize the solubility of the test item under specific test exposure conditions, but to reduce exposure to the test organisms to insoluble fractions. A control medium without the addition of the test item was stirred and extracted in an identical ways as the treated media. The effects of both filtering and adjusting pH were investigated in a range finding test. In the range finding test, there was 60% mortality in the 1000 mg/l filtered treatment group and 90% mortality in the pH adjusted 1000 mg/l. The definitive test was conducted at WAF from initial loading rates of 125, 250, 500 and 1000 mg/l with unfiltered WAF and no pH adjustments. There was 50% mortality in the 1000 mg/l treatment group at 24 hr and 85% in this group at 48 hr. The 48 hr EL_{50} was 911 mg/l and the No Observed Effect Loading Rate ($NOEL_r$) was 750 mg/l.
Data Quality	Valid without restriction – Klimisch Code 1a
Reference	Kelly, C. 2002. Rosin, CAS No. 8050-09-7 Determination of Acute Toxicity (EL_{50}) to Daphnia (48 h, Static). Report Number 20627. Inveresk Research, Tranent, Scotland.

ECOTOXICITY – ALGA, GROWTH INHIBITION	
Test substance	
Chemical Name	Rosin
CAS #	8050-09-7

Method	
Method/Guideline followed	OECD Test Method 201, *"Testing of Chemicals, Alga, Growrh Inhibition Test"* and following procedures in OECD (2000) Series on Testing and Assessment, No. 23, *"Guidance Document on Aquatic Toxicity Testing of Difficult Substances and Mixtures."*
Year	2002
GLP (Y/N)	Y
System of testing	Green alga (*Selenastrum capriconutum)* growth inhibition.
Concentration	0, 1, 10, 100 and 1000 mg/l (range finding test) 1000 mg/l (definitive test)
Results	The 72 hr EL_{50} for area under growth curve (AUC) and Average Specific Growth Rate (0-72h) was > 1000 mg/l. The No Observed Effect Loading Rate ($NOEL_r$) for Average Specific Growth Rate and AUC was > 1000 mg/l.
Detailed Summary	Rosin was tested in alga to determine the median effective loading (EL_{50}) for growth inhibition. Water accommodated fractions (WAF) were prepared using the same conditions as those used to determine the water solubility of this substance. Appropriate weights of rosin were added to a stirring medium in glass vessels which were sealed to avoid loss of volatile fractions. Using magnetic stirrers, the stirring speed was adjusted to give a stirring vortex 5-10% of the water column. After a stirring period of approximately 48 hr. the test solutions were allowed to settle for ca hour. The WAF was then removed via a glass siphon taking care not to remove undissolved material at the top of bottom of the water column. The test organisms were exposed to this WAF. This procedure was adopted to maximize the solubility of the test item under specific test exposure conditions, but to reduce exposure to the test organisms to insoluble fractions. A control medium without the addition of the test item was stirred and extracted in an identical ways as the treated media. The effects of both filtering and adjusting pH were investigated in a range finding test at the highest loading rate. Because there was no inhibition of algal growth in the range finding test in any test groups, a definitive limit test was conducted at 1000 mg/l with algal cell concentrations recorded after 1, 24, 48 and 76 hrs. This test was conducted using an unfiltered WAF with no pH adjustment. As no effects or inhibition was observed the 72 hr EL_{50} was > 1000 mg/l for area under growth curve (AUC) and Average Specific Growth Rate (0-72h). Consequently, the No Observed Effect Loading Rate ($NOEL_r$) for AUC and Average Specific Growth Rate is 1000 mg/l.
Data Quality	Valid without restriction – Klimisch Code 1a
Reference	Kelly, C. 2002. Rosin, CAS No. 8050-09-7 Alga, Growth Inhibition Test (72 h, EL_{50}). Report Number 20681. Inveresk Research, Tranent, Scotland.

ACUTE TOXICITY – ORAL	
Test substance	
Chemical Name	Rosin
CAS #	8050-09-7
Method	

Method/Guideline followed	Test procedure was similar to OECD Test Method 401, *"Acute Oral Toxicity"*
GLP (Y/N)	N
Year (Study Performed)	1961
Species	Rats, mice, guinea pigs
Strain	Not specified
Route of administration	Oral
Dose levels	Dose levels not specified.
Sex and number/group	10 male rats, mice or guinea pigs
Frequency of treatment	Single oral gavage
Duration of test	14 day observation post-treatment
Control group (Y/N)	N
Results	
Acute Oral LD_{50}	Rats: 7,600, 8,400, and 7,600 mg/kg for gum, wood and tall oil rosin, respectively; mice: 4,600, 4,100 and 4,600 mg/kg for gum, wood and tall oil rosin, respectively; guinea pigs: 4,100, 4,100 and 4,600 mg/kg for gum, wood and tall oil rosin, respectively.
Detailed Summary	Male rats, mice or guinea pigs (n = 10) received graded oral gavage doses in corn oil of gum, wood or tall oil rosin (CAS #8050-09-7) and were observed for 14 days. Parameters evaluated included clinical signs, mortality, and gross necropsy. The oral LD_{50} values were calculated according to the method of Litchfield and Wilcoxon.
Data Quality	Reliable with restriction – Klimisch Code 2c
Reference	Kay, J.H. 1961. Acute toxicity of rosins. Industrial Bio-Test Laboratories, Northbrook, IL.

ACUTE TOXICITY – ORAL	
Test substance	
Chemical Name	Hydrogenated rosin
CAS #	65997-06-0
Method	
Method/Guideline followed	Test procedure was similar to OECD Test Method 401, *"Acute Oral Toxicity"*
GLP (Y/N)	N
Year (Study Performed)	1982
Species	Rat
Strain	Wistar
Route of administration	Oral
Dose levels	30 mL/kg (approximately equivalent to 32,000 mg/kg, based on a density of 1.05 g/mL)
Sex and number/group	10 male and 10 female rats
Frequency of treatment	Single oral gavage
Duration of test	14 day observation post-treatment
Control group (Y/N)	N
Result	
Acute Oral LD_{50}	>30 mL/kg (or 32,000 mg/kg)
Detailed Summary	Wistar rats (n = 10/sex) received a single oral dose of 30 mL/kg hydrogenated rosin (CAS #65997-06-0) and were observed for 14 days. Parameters evaluated included clinical signs, mortality, and gross necropsy. One day after dosing, the rats were sluggish and had slight diarrhea. All of the animals recovered

	during the observation period and no deaths occurred. Gross necropsy revealed no treatment-related effects; the oral LD_{50} was reported as greater than 30 mL/kg (approximately equivalent to 32 g/kg, based on a density of 1.05 g/mL).
Data Quality	Valid with restriction – Klimisch Code 1b
Reference	Spanjers, M.Th. 1981. Determination of the acute oral toxicity of [hydrogenated rosin -- trade name deleted] in rats. CIVO-TNO.

ACUTE TOXICITY – ORAL	
Test substance	
Chemical Name	Rosin, distillation overheads
CAS #	68425-08-1
Method	
Method/Guideline followed	Test procedure was OECD Test Method 425 *"Acute Oral Toxicity – Up-and-Down Procedure"*
GLP (Y/N)	Y
Year (Study Performed)	2002
Species	Rat
Strain	Sprague-Dawley
Route of administration	Oral
Dose levels	2000 mg/kg
Sex and number/group	5 female rats
Frequency of treatment	Single oral gavage
Duration of test	14 day observation post-treatment
Control group (Y/N)	N
Result	
Acute Oral LD_{50}	>2,000 mg/kg
Detailed Summary	The initial dose level was 2000 mg/kg as this is the dose level suggested by the OECD Guideline. One female animal was dosed with 2000 mg/kg. Since this animal survived 4 additional animals were dosed sequentially at 2000 mg/kg so that a total of 5 animals were tested. The test item was dissolved in corn oil and administered orally in a single dose, by means of a gavage, followed by a 14 day observation period. A constant dose volume of 4 ml/kg was used. All animals were examined for reaction to treatment. The onset, intensity and duration of any signs were recorded. Clinical observations were conducted frequently after dosing on Day 1and daily thereafter until Day 15. There were no mortalities or adverse clinical signs noted during the observation period. Body weight gain was considered to have been satisfactory. No findings were noted at necropsy. Following a single oral administration of rosin, distillation overheads to Sprague-Dawley rats, the median lethal dose (LD_{50}) is estimated to be > 2000 mg/kg.
Data Quality	Valid without restriction – Klimisch Code 1a
Reference	Hutchinson, A.M.K. 2002. Rosin, distillation overheads (CAS No. 68425-08-1) Acute Oral Toxicity (Up-and-Down Procedure) Test in Rats. Report No. 22029. Inveresk Research, Tranent, Scotland.

REPEAT DOSE TOXICITY	
Test substance	
Chemical Name	Rosin
CAS #	8050-09-7
Method	
Method/Guideline followed	Test procedure is similar to OECD Test Method 407, *"Repeat Dose 28-Day Oral Toxicity Study in Rodents."*
Year	1960
GLP (Y/N)	N (pre-GLP)
Species	Rat
Strain	Sprague-Dawley
Sex	Male, female
Route of Administration	Oral, diet
Exposure Period	90 days
Frequency of Treatment	Daily
Post-exposure observation period	None
Dose Levels	0, 0.01, 0.05, 0.2, 1, or 5%
Control group (Y/N)	Y
Results	
NOEL:	0.2%, approximately 200 mg/kg/day
Detailed Summary	Weanling Sprague-Dawley rats (n = 10/sex/group) were treated with gum rosin (CAS # 8050-09-7) in the diet at concentrations of 0, 0.01, 0.05, 0.2, 1, or 5% for 90 days. The approximate doses were 0, 10, 50, 200, 1,000, or 5,000 mg/kg/day, based on standard conversion factors (WHO 1990). Parameters evaluated included clinical signs, mortality, body weight, body weight gain, food consumption, food utilization, hematology parameters (hemoglobin concentration, hematocrit, total and differential leukocyte counts), urinalysis parameters (reducing substances, albumin, microscopic elements), gross pathology, organ weights (brain, heart, liver, kidneys, spleen, testes/ovaries), and microscopic pathology (brain, liver, spleen, stomach, small intestine, colon, pancreas, kidneys, urinary bladder, adrenals, gonads, thyroid, parathyroid, lymph nodes, heart, lungs, bone marrow, muscle, prostate, uterus). All of the rats dosed with 5% gum rosin died between days 3 and 7. These animals exhibited significant weight loss and a marked decrease in food consumption. Starvation through refusal to eat was considered the primary cause of death. No other mortalities occurred and no adverse clinical signs were noted. A decrease in mean body weight was reported in rats treated with 1%; body weight gain was also slightly decreased in this group. Food consumption and food utilization (grams gained/grams food consumed) were decreased at 1%. For food utilization, the decrease occurred during the first two weeks, but was comparable to control levels thereafter indicating that palatability was the principal cause of the depression. The body weight and food effects were primarily noted in the first few weeks of the study. No treatment-related effects on hematology or urinalysis parameters were reported. At necropsy, no changes were noted that were related to treatment. Absolute organ weights were not

	affected, but some of the relative weights in the 1% group were altered. These changes were related to the decreased body weight in this group and were not considered to be a direct treatment effect. No histopathological changes were observed in any organ. Reproductive organs (*i.e.*, testes, ovaries, uterus) showed no evidence of toxicity at any dose level. Based on these data, it appears that the NOEL was 0.2% (approximately 200 mg/kg/day).
Data Quality	Valid without restriction – Klimisch Code 1b
References	Calandra, J.C. 1960. Ninety-day subacute oral toxicity of gum rosin. Industrial Bio-Test Laboratories, Inc., Northbrook, Illinois. World Health Organization (WHO). 1990. Principles for the Toxicological Assessment of Pesticide Residues in Food.

REPEAT DOSE TOXICITY	
Test substance	
Chemical Name	Rosin
CAS #	8050-09-7
Method	
Method/Guideline followed	Test procedure is similar to OECD Test Method 407, *"Repeat Dose 28-Day Oral Toxicity Study in Rodents."*
Year	1960
GLP (Y/N)	N (pre-GLP)
Species	Rat
Strain	Sprague-Dawley
Sex	Male, female
Route of Administration	Oral, diet
Exposure Period	90 days
Frequency of Treatment	Daily
Post-exposure observation period	None
Dose Levels	0, 0.01, 0.05, 0.2, 1, or 5%
Control group (Y/N)	Y
Results	
NOEL:	0.2%, approximately 200 mg/kg/day
Detailed Summary	Weanling Sprague-Dawley rats (n = 10/sex/group) were treated with rosin (CAS # 8050-09-7) in the diet at concentrations of 0, 0.01, 0.05, 0.2, 1, or 5% for 90 days. The approximate doses were 0, 10, 50, 200, 1,000, or 5,000 mg/kg/day, based on standard conversion factors (WHO 1990). Parameters evaluated included clinical signs, mortality, body weight, body weight gain, food consumption, food utilization, hematology parameters (hemoglobin concentration, hematocrit, total and differential leukocyte counts), urinalysis parameters (reducing substances, albumin, microscopic elements), gross pathology, organ weights (brain, heart, liver, kidneys, spleen, testes/ovaries), and microscopic pathology (brain, liver, spleen, stomach, small intestine, colon, pancreas, kidneys, urinary bladder, adrenals, gonads, thyroid, parathyroid, lymph nodes, heart, lungs, bone marrow, muscle, prostate, uterus). All animals treated with 5% rosin died between days 4 and 12.

	These animals exhibited significant weight loss and a marked decrease in food consumption. Death was related to starvation associated with food refusal. One other death occurred on day 77 in the low-dose group, but this was not treatment-related. No adverse clinical signs were noted in any group. Decreases in mean body weight and body weight gain were reported in rats treated with 1%. In addition, food consumption and food utilization (grams gained/grams food consumed) were decreased at this dose level. For food utilization, the decrease primarily occurred during the first week of dosing, but was comparable to control levels thereafter indicating that palatability was the principal cause of the depression. A slight decrease in body weight, body weight gain and food consumption were reported at 0.2%; food utilization was unaffected in this group. No treatment-related effects on hematology or urinalysis parameters were reported. Statistical analyses revealed increases in absolute liver weights in the 1% animals as well as increases in select organ to body weight ratios (primarily liver, kidney, spleen in males, and liver in females). These changes were not considered to be toxicologically significant because the animals in this group exhibited decreased body weight and no histopathological changes were observed in any organ. Reproductive organs (*i.e.*, testes, ovaries, uterus) showed no evidence of toxicity at any dose level. Based on these data, it appears that the NOAEL was 0.2% (approximately 200 mg/kg/day).
Data Quality	Valid without restriction – Klimisch Code 1b
References	Calandra, J.C. 1960. Ninety-day subacute oral toxicity of [trade name deleted] rosin. Industrial Bio-Test Laboratories, Inc., Northbrook, Illinois. World Health Organization (WHO). 1990. Principles for the Toxicological Assessment of Pesticide Residues in Food.

REPEAT DOSE TOXICITY	
Test substance	
Chemical Name	Rosin
CAS #	8050-09-7
Method	
Method/Guideline followed	Test procedure is similar to OECD Test Method 407, *"Repeat Dose 28-Day Oral Toxicity Study in Rodents."*
Year	1960
GLP (Y/N)	N (pre-GLP)
Species	Rat
Strain	Sprague-Dawley
Sex	Male, female
Route of Administration	Oral, diet
Exposure Period	90 days
Frequency of Treatment	Daily
Post-exposure observation period	None
Dose Levels	0, 0.01, 0.05, 0.2, 1, or 5%
Control group (Y/N)	Y

Results	
NOAEL:	0.2%, approximately 200 mg/kg/day
Detailed Summary	Weanling Sprague-Dawley rats (n = 10/sex/group) were treated with rosin (CAS # 8050-09-7) in the diet at concentrations of 0, 0.01, 0.05, 0.2, 1, or 5% for 90 days. The approximate doses were 0, 10, 50, 200, 1,000, or 5,000 mg/kg/day, based on standard conversion factors (WHO 1990). Parameters evaluated included clinical signs, mortality, body weight, body weight gain, food consumption, food utilization, hematology parameters (hemoglobin concentration, hematocrit, total and differential leukocyte counts), urinalysis parameters (reducing substances, albumin, microscopic elements), gross pathology, organ weights (brain, heart, liver, kidneys, spleen, testes/ovaries), and microscopic pathology (brain, liver, spleen, stomach, small intestine, colon, pancreas, kidneys, urinary bladder, adrenals, gonads, thyroid, parathyroid, lymph nodes, heart, lungs, bone marrow, muscle, prostate, uterus). Eighteen of the animals treated with 5% resin died between days 4 and 18. An additional two animals died on days 46 and 77. These animals exhibited significant weight loss and decreases in food consumption and food utilization. Death was related to starvation associated with food refusal. One death occurred on day 70 at 0.01% and another death occurred on day 54 at 0.2%; these were isolated findings and were not considered to be treatment-related. No adverse clinical signs were noted in any group. Decreases in mean body weight and body weight gain were reported in rats treated with 0.2 and 1%; the effect was slight at 0.2%. Food consumption and food utilization were decreased at 1%. No treatment-related effects on hematology or urinalysis parameters were reported. At necropsy, no adverse effects were reported. Some organ weight alterations were noted in the 1% dose group, but due to the significant depression in body weights in this group, the effects are not considered to be toxicologically significant. No histopathological changes were observed in any organ. Reproductive organs (*i.e.*, testes, ovaries, uterus) showed no evidence of toxicity at any dose level. Based on these data, it appears that the NOAEL was 0.2% (approximately 200 mg/kg/day).
Data Quality	Valid without restriction – Klimisch Code 1b
References	Calandra, J.C. 1960. Ninety-day subacute oral toxicity of resin [trade name deleted]. Industrial Bio-Test Laboratories, Inc., Northbrook, Illinois. World Health Organization (WHO). 1990. Principles for the Toxicological Assessment of Pesticide Residues in Food.

REPEAT DOSE TOXICITY	
Test substance	
Chemical Name	Rosin
CAS #	8050-09-7
Method	
Method/Guideline followed	Test procedure is similar to OECD Test Method 407, *"Repeat Dose 28-Day Oral Toxicity Study in Rodents."*
Year	1960
GLP (Y/N)	N (pre-GLP)
Species	Rat
Strain	Sprague-Dawley
Sex	Male, female
Route of Administration	Oral, diet
Exposure Period	90 days
Frequency of Treatment	Daily
Post-exposure observation period	None
Dose Levels	0, 0.01, 0.05, 0.2, 1, or 5%
Control group (Y/N)	Y
Results	
NOEL:	0.2%, approximately 200 mg/kg/day
Detailed Summary	Weanling Sprague-Dawley rats (n = 10/sex/group) were treated with wood rosin (CAS # 8050-09-7) in the diet at concentrations of 0, 0.01, 0.05, 0.2, 1, or 5% for 90 days. The approximate doses were 0, 10, 50, 200, 1,000, or 5,000 mg/kg/day, based on standard conversion factors (WHO (1990). Parameters evaluated included clinical signs, mortality, body weight, body weight gain, food consumption, food utilization, hematology parameters (hemoglobin concentration, erythrocyte count, total and differential leukocyte counts), urinalysis parameters (reducing substances, albumin, microscopic elements), gross pathology, organ weights (brain, heart, liver, kidneys, spleen, testes/ovaries), and microscopic pathology (brain, liver, spleen, stomach, small intestine, colon, pancreas, kidneys, urinary bladder, adrenals, gonads, thyroid, parathyroid, lymph nodes, heart, lungs, bone marrow, muscle, prostate, uterus). Nine rats treated with 5% wood rosin died on days 7 and 8; the deaths were related to starvation associated with food refusal. No other mortalities occurred during the study, and no adverse clinical signs were noted in any group. The animals treated with 5% exhibited significant weight loss, especially during the first six weeks of the study. A marked decrease in food consumption was also noted in the high-dose animals, but this corresponded more to food "disappearance" (*i.e.*, scattering) than to a true decrease in food consumption; palatability was considered to be the primary factor involved. Decreases in mean body weight and body weight gain were reported in rats treated with 1%, but the decreases were not statistically significant. Food consumption was not affected in the 1% group, but food utilization was slightly decreased. No treatment-related effects on hematology or urinalysis parameters were reported. At necropsy, the kidneys of the high-dose animals (5% group) were described as: stippled and yellow in color; the cortex was thin; the cortico-medullary

	junction was indistinct; and there were discolored patches intermingled with cyst-like areas. These effects were not observed in any other dose group. Significant increases in absolute and relative liver weights were reported at 1 and 5%. Other organ weight changes noted at 5% were associated with the depression in body weight in this group. Histopathological examination revealed marked dilation and tortuosity of the renal distal convoluted and collecting segment tubules of the high-dose rats. In addition, a few glomeruli revealed active inflammatory and degenerative changes without proliferation or organization. Reproductive organs (*i.e.*, testes, ovaries, uterus) showed no evidence of toxicity at any dose level. Based on these data, it appears that the NOEL was 0.2% (approximately 200 mg/kg/day).
Data Quality	Valid without restriction – Klimisch Code 1b
References	Calandra, J.C. 1960. Ninety-day subacute oral toxicity of b-wood resin. Industrial Bio-Test Laboratories, Inc., Northbrook, Illinois. World Health Organization (WHO). 1990. Principles for the Toxicological Assessment of Pesticide Residues in Food.

REPEAT DOSE TOXICITY	
Test substance	
Chemical Name	Rosin
CAS #	8050-09-7
Method	
Method/Guideline followed	Test procedure is similar to OECD Test Method 407, *"Repeat Dose 28-Day Oral Toxicity Study in Rodents."*
Year	1960
GLP (Y/N)	N (pre-GLP)
Species	Rat
Strain	Sprague-Dawley
Sex	Male, female
Route of Administration	Oral, diet
Exposure Period	90 days
Frequency of Treatment	Daily
Post-exposure observation period	None
Dose Levels	0, 0.01, 0.05, 0.2, 1, or 5%
Control group (Y/N)	Y
Results	
NOAEL:	0.2%, approximately 200 mg/kg/day
Detailed Summary	Weanling Sprague-Dawley rats (n = 10/sex/group) were treated with wood rosin (CAS # 8050-09-7) in the diet at concentrations of 0, 0.01, 0.05, 0.2, 1, or 5% for 90 days. The approximate doses were 0, 10, 50, 200, 1,000, or 5,000 mg/kg/day, based on standard conversion factors (WHO 1990). Parameters evaluated included clinical signs, mortality, body weight, body weight gain, food consumption, food utilization, hematology parameters (hemoglobin concentration, hematocrit, total and differential leukocyte counts), urinalysis parameters (reducing substances, albumin, microscopic elements), gross pathology, organ weights

	(brain, heart, liver, kidneys, spleen, testes/ovaries), and microscopic pathology (brain, liver, spleen, stomach, small intestine, colon, pancreas, kidneys, urinary bladder, adrenals, gonads, thyroid, parathyroid, lymph nodes, heart, lungs, bone marrow, muscle, prostate, uterus). All animals treated with 5% wood rosin died between days 3 and 8. These animals exhibited significant weight loss and a marked decrease in food consumption. Starvation through food refusal was identified as the primary cause of death. No adverse clinical signs were noted in any group. Slight decreases in mean body weight and body weight gain were reported in the rats treated with 1%. Food consumption was also slightly decreased at 1%, but food utilization was unaffected. In the 0.05% dose group, food consumption was decreased, but no explanation for this "apparent discrepancy" was provided; this effect is unlikely to be treatment-related. No treatment-related effects on hematology or urinalysis parameters were reported. At necropsy, no gross changes were observed. Statistical analyses revealed increases in absolute liver weights as well as increases in liver to body and brain weight ratios in the 1% dose group. These changes were not considered to be toxicologically significant because the animals in this group exhibited decreased body weight and no histopathological changes were observed in any organ. Reproductive organs (*i.e.*, testes, ovaries, uterus) showed no evidence of toxicity at any dose level. Based on these data, it appears that the NOAEL was 0.2% (approximately 200 mg/kg/day).
Data Quality	Valid without restriction – Klimisch Code 1b
References	Calandra, J.C. 1960. Ninety-day subacute oral toxicity of n-wood rosin. Industrial Bio-Test Laboratories, Inc., Northbrook, Illinois. World Health Organization (WHO). 1990. Principles for the Toxicological Assessment of Pesticide Residues in Food.

REPEAT DOSE TOXICITY	
Test substance	
Chemical Name	Rosin
CAS #	8050-09-7
Method	
Method/Guideline followed	Test procedure is similar to EPA Test Method OPPTS 870.4200, "*Carcinogenicity."*
Year	1962
GLP (Y/N)	N (pre-GLP)
Species	Rat
Strain	Sprague-Dawley
Sex	Male, female
Route of Administration	Oral, diet
Exposure Period	Two years
Frequency of Treatment	Daily
Post-exposure observation period	None

Dose Levels	0, 0.05, 1%
Control group (Y/N)	Y
Results	
NOEL:	0.05%, approximately 50 mg/kg/day
Detailed Summary	Weanling Sprague-Dawley rats (n = 30 /sex/dose) were exposed to gum rosin (CAS # 8050-09-7) at dietary concentrations of 0, 0.05, or 1% for two years. The approximate doses were 0, 50, or 1000 mg/kg/day, based on standard conversion factors (WHO 1990). Parameters evaluated included clinical signs, mortality, body weight, body weight gain, food consumption, food utilization, hematology parameters (hemoglobin concentration, erythrocyte count, total and differential leukocyte counts), urinalysis parameters (reducing substances, albumin, microscopic elements), gross pathology, organ weights (liver, kidneys, spleen, gonads, heart, brain, thyroid gland, adrenal gland), tumor incidence (organs examined not specified), and microscopic pathology (heart, lung, trachea, liver, pancreas, stomach, small intestine, colon, spleen, lymph node, kidney, urinary bladder, testis, ovary, prostate, uterus, pituitary, adrenal gland, salivary gland, thyroid gland, parathyroid gland, skeletal muscle, bone marrow, brain). No treatment-related increase in mortality was reported. The only clinical signs were generalized inactivity and weakness in the animals dying on study. Mean body weight and body weight gain were statistically significantly decreased at 1%. Food consumption was also decreased in the high-dose group, but food utilization was only slightly decreased. These effects were attributed to the palatability of the test diet. No treatment-related effects were reported on hematology, urinalysis, organ weights, and gross and microscopic pathology. Reproductive organs (*i.e.*, testes, ovaries, uterus) showed no evidence of toxicity at any dose level. The tumor incidence and tumor types were similar in the test and control groups. Based on these data, it appears that the NOEL was 0.05% (approximately 50 mg/kg/day).
Data Quality	Valid without restriction – Klimisch Code 1b
References	Kay, J.H. 1962. Two-year chronic oral toxicity of b-wood resin – albino rats. Industrial Bio-Test Laboratories, Inc., Northbrook, Illinois. World Health Organization (WHO). 1990. Principles for the Toxicological Assessment of Pesticide Residues in Food.

REPEAT DOSE TOXICITY	
Test substance	
Chemical Name	Rosin
CAS #	8050-09-7
Method	
Method/Guideline followed	Test procedure is similar to EPA Test Method OPPTS 870.4200, "*Carcinogenicity."*
Year	1962
GLP (Y/N)	N (pre-GLP)
Species	Rat
Strain	Sprague-Dawley
Sex	Male, female
Route of Administration	Oral, diet
Exposure Period	Two years
Frequency of Treatment	Daily
Post-exposure observation period	None
Dose Levels	0, 0.05, 0.2, 1%
Control group (Y/N)	Y
Results	
NOEL:	0.2%, approximately 200 mg/kg/day
Detailed Summary	Weanling Sprague-Dawley rats (n = 30 /sex/dose) were exposed to wood rosin (CAS # 8050-09-7) at dietary concentrations of 0, 0.05, 0.2, or 1% for two years. The approximate doses were 0, 50, 200, or 1000 mg/kg/day, based on standard conversion factors provided by WHO (WHO 1990). Parameters evaluated included clinical signs, mortality, body weight, body weight gain, food consumption, food utilization, hematology parameters (hemoglobin concentration, erythrocyte count, total and differential leukocyte counts), urinalysis parameters (reducing substances, albumin, microscopic elements), gross pathology, organ weights (liver, kidneys, spleen, gonads, heart, brain, thyroid gland, adrenal gland), tumor incidence (organs examined not specified), and microscopic pathology (heart, lung, trachea, liver, pancreas, stomach, small intestine, colon, spleen, lymph node, kidney, urinary bladder, testis, ovary, prostate, uterus, pituitary, adrenal gland, salivary gland, thyroid gland, parathyroid gland, skeletal muscle, bone marrow, brain). No treatment-related increase in mortality was reported. The only clinical signs were generalized inactivity and weakness in the animals dying on study. In the high-dose group, mean body weight and body weight gain were statistically significantly decreased in both sexes at the interim (12-month) sacrifice and in the females at the terminal sacrifice. These parameters were slightly decreased in the males at 24 months. Food consumption was decreased in the high-dose group, but food utilization was generally comparable to control levels. The effects on body weight and food consumption were attributed to the palatability of the test diet. No treatment-related effects were reported on hematology, urinalysis, and gross and microscopic pathology. Relative liver weight was significantly increased in the females treated with 1%. Reproductive organs (*i.e.*, testes, ovaries, uterus) showed no evidence of toxicity at any dose level. The

	tumor incidence and tumor types were similar in the test and control groups. Based on these data, it appears that the NOEL was 0.2% (approximately 200 mg/kg/day).
Data Quality	Valid without restriction – Klimisch Code 1b
References	Kay, J.H. 1962. Two-year chronic oral toxicity of n-wood rosin – albino rats. Industrial Bio-Test Laboratories, Inc., Northbrook, Illinois. World Health Organization (WHO). 1990. Principles for the Toxicological Assessment of Pesticide Residues in Food.

REPEAT DOSE TOXICITY	
Test substance	
Chemical Name	Rosin
CAS #	8050-09-7
Method	
Method/Guideline followed	Test procedure is similar to EPA Test Method OPPTS 870.4200, "*Carcinogenicity."*
Year	1962
GLP (Y/N)	N (pre-GLP)
Species	Rat
Strain	Sprague-Dawley
Sex	Male, female
Route of Administration	Oral, diet
Exposure Period	Two years
Frequency of Treatment	Daily
Post-exposure observation period	None
Dose Levels	0, 0.05, 1%
Control group (Y/N)	Y
Results	
NOEL:	0.05%, approximately 50 mg/kg/day
Detailed Summary	Weanling Sprague-Dawley rats (n = 30 /sex/dose) were exposed to gum rosin (CAS # 8050-09-7) at dietary concentrations of 0, 0.05, or 1% for two years. The approximate doses were 0, 50, or 1000 mg/kg/day, based on standard conversion factors (WHO 1990). Parameters evaluated included clinical signs, mortality, body weight, body weight gain, food consumption, food utilization, hematology parameters (hemoglobin concentration, erythrocyte count, total and differential leukocyte counts), urinalysis parameters (reducing substances, albumin, microscopic elements), gross pathology, organ weights (liver, kidneys, spleen, gonads, heart, brain, thyroid gland, adrenal gland), tumor incidence (organs examined not specified), and microscopic pathology (heart, lung, trachea, liver, pancreas, stomach, small intestine, colon, spleen, lymph node, kidney, urinary bladder, testis, ovary, prostate, uterus, pituitary, adrenal gland, salivary gland, thyroid gland, parathyroid gland, skeletal muscle, bone marrow, brain). No treatment-related increase in mortality was reported. The only clinical signs were generalized inactivity and weakness in the animals dying on study. Mean body weight and body weight gain

	were statistically significantly decreased at 1%. Food consumption was also decreased in the high-dose group, but food utilization was unaffected. The effects on body weight and food consumption were attributed to the palatability of the test diet. No treatment-related effects were reported on hematology, urinalysis, and gross and microscopic pathology. Relative liver weight was significantly increased at 1%. Reproductive organs (*i.e.*, testes, ovaries, uterus) showed no evidence of toxicity at any dose level. The tumor incidence and tumor types were similar in the test and control groups. Based on these data, it appears that the NOEL was 0.05% (approximately 50 mg/kg/day).
Data Quality	Valid without restriction – Klimisch Code 1b
References	Kay, J.H. 1962. Two-year chronic oral toxicity of gum rosin – albino rats. Industrial Bio-Test Laboratories, Inc., Northbrook, Illinois. World Health Organization (WHO). 1990. Principles for the Toxicological Assessment of Pesticide Residues in Food.

REPRODUCTION/DEVELOPMENTAL TOXICITY SCREENING TEST	
Test substance	
Chemical Name	Rosin
CAS #	8050-09-7
Method	
Method/Guideline followed	OECD Guideline 421, *"Reproduction/Developmental Toxicity Screening Test"*
Year	2002
GLP (Y/N)	Y
Species	Rat
Strain	Sprague-Dawley
Sex	Male, female
Route of Administration	Oral, diet
Exposure Period	28 days; males dosed for 2 wks prior to mating; females dosed for 2 wks prior to mating until at least Day 4 of lactation.
Frequency of Treatment	Daily
Post-exposure observation period	None
Dose Levels	0, 1000, 3000 and 10000 ppm
Control group (Y/N)	Y
Results	
NOEL:	105 mg/kg/day for adults and 275 mg/kg/day for reproductive/developmental effects
Detailed Summary	Four groups of 10 male and 10 female Sprague-Dawley rats received rosin *via* the diet at concentrations of 0, 1000, 3000 and 10000 ppm; the approximate doses were 0, 105, 275, or 825 mg/kg/day. The males were dosed for at least 4 weeks, starting from 2 weeks prior to mating. The females were dosed from 2 weeks prior to mating until at least Day 4 of lactation. The animals were monitored for clinical signs, body weight, food consumption, mating and litter performance. At termination, the adults received a gross necropsy, with weights of testes and epididymides recorded; histological examination was restricted to

	the testes, epididymides and ovaries from control and high dose animals. Treatment with rosin at 10000 ppm was significantly associated with reduced weight gain and weight loss and reduced food consumption for the first few weeks of treatment; the deficits in body weight were never regained. Food consumption was significantly reduced throughout gestation and body weight gain was reduced during the first half of gestation. At 10000 ppm the mean number of implant sites per pregnancy was slightly decreased resulting in a subsequent reduction in litter size. Mean litter and pup weights were also slightly reduced. However, none of these effects were significantly different from controls. The effects on implantation, litter size and fetal weight were likely secondary to the effects on food intake and subsequent weight gain in the adult females. Litter survival, as indicated by the birth index and viability index, was similar in all groups. There were no effects of treatment on mating performance, fertility or the duration of gestation. No obvious external abnormalities were noted in the pups at any dose level. Testes and epididymides weight were essentially similar in all groups and there were no histology findings that could be attributed to treatment with rosin. Body weight gain was slightly reduced in males at 3000 ppm although this was not significantly different from controls. The minor change in food consumption was too small to be attributed to treatment. The no observed effect level (NOEL) for adults was considered to be 1000 ppm (105 mg/kg/day) (due to slight weight changes at 3000 ppm) and the NOEL for reproductive/developmental effects was 3000 ppm (275 mg/kg/day).
Data Quality	Valid without restriction – Klimisch Code 1a
References	Clubb, S. and Sutherland, J.R. 2002. Rosin (CAS No. 8050-09-7) Reproduction/Developmental Toxicity Screening Test. Report No. 21491. Inveresk Research, Tranent, Scotland.

REPEAT DOSE TOXICITY	
Test substance	
Chemical Name	Hydrogenated rosin
CAS #	65997-06-0
Method	
Method/Guideline followed	Test procedure is similar to OECD Test Method 407, *"Repeat Dose 28-Day Oral Toxicity Study in Rodents."*
Year	1960
GLP (Y/N)	N (pre-GLP)
Species	Rat
Strain	Sprague-Dawley
Sex	Male, female
Route of Administration	Oral, diet
Exposure Period	90 days
Frequency of Treatment	Daily
Post-exposure observation period	None
Dose Levels	0, 0.01, 0.05, 0.2, 1, or 5%
Control group (Y/N)	Y
Results	
NOAEL:	0.2%, approximately 200 mg/kg/day
Detailed Summary	Weanling Sprague-Dawley rats (n = 10/sex/group) were treated with hydrogenated rosin (CAS # 65997-06-0) in the diet at concentrations of 0, 0.01, 0.05, 0.2, 1, or 5% for 90 days. The approximate doses were 0, 10, 50, 200, 1,000, or 5,000 mg/kg/day, based on standard conversion factors (WHO 1990). Parameters evaluated included clinical signs, mortality, body weight, body weight gain, food utilization, hematology parameters (hemoglobin concentration, hematocrit, total and differential leukocyte counts), urinalysis parameters (reducing substances, albumin, microscopic elements), gross pathology, organ weights (brain, heart, liver, kidneys, spleen, testes/ovaries), and microscopic pathology (brain, liver, spleen, stomach, small intestine, colon, pancreas, kidneys, urinary bladder, adrenals, gonads, thyroid, parathyroid, lymph nodes, heart, lungs, bone marrow, muscle, prostate, uterus). All the animals in the high-dose group died prior to study termination. These deaths occurred between study day 3 and 11 and were attributed to starvation through food refusal (*i.e.*, treatment-related). Rats in this group also experienced weight loss and a marked decrease in food consumption. In the 1% group, body weight was significantly decreased in both males and females, and food consumption was decreased. With the exception of the first week of dosing, food utilization (grams gained/gram food consumed) was not affected at a dietary concentration of 1% indicating that the reduced food consumption was related to its palatability. No treatment-related effects on hematology, urinalysis, or gross or microscopic pathology. Some statistically significant organ weight effects were reported in the 1% dose group, but these were considered to arise secondary to decreased body weight. Reproductive organs (*i.e.*, testes, ovaries, uterus) showed /no evidence of toxicity at any dose level. Based on these data, it appears that the NOEL was 0.2%

	(approximately 200 mg/kg/day).
Data Quality	Valid without restriction – Klimisch Code 1b
References	Calandra, J.C. 1960. Ninety-day subacute oral toxicity of [trade name deleted] hydrogenated rosin. Industrial Bio-Test Laboratories, Inc., Northbrook, Illinois. World Health Organization (WHO). 1990. Principles for the Toxicological Assessment of Pesticide Residues in Food.

REPEAT DOSE TOXICITY	
Test substance	
Chemical Name	Hydrogenated rosin
CAS #	65997-06-0
Method	
Method/Guideline followed	Test procedure is similar to EPA Test Method OPPTS 870.4200, "*Carcinogenicity."*
Year	1962
GLP (Y/N)	N (pre-GLP)
Species	Rat
Strain	Sprague-Dawley
Sex	Male, female
Route of Administration	Oral, diet
Exposure Period	Two years
Frequency of Treatment	Daily
Post-exposure observation period	None
Dose Levels	0, 0.05, 0.2, 1%
Control group (Y/N)	Y
Results	
NOEL:	0.2%, approximately 200 mg/kg/day
Detailed Summary	Weanling Sprague-Dawley rats (n = 30 /sex/dose) were exposed to hydrogenated rosin (CAS # 65997-06-0) at dietary concentrations of 0, 0.05, 0.2, or 1% for two years. The approximate doses were 0, 50, 200, or 1000 mg/kg/day, based on standard conversion factors (WHO 1990). Parameters evaluated included clinical signs, mortality, body weight, body weight gain, food consumption, food utilization, hematology parameters (hemoglobin concentration, erythrocyte count, total and differential leukocyte counts), urinalysis parameters (reducing substances, albumin, microscopic elements), gross pathology, organ weights (liver, kidneys, spleen, gonads, heart, brain, thyroid gland, adrenal gland), tumor incidence (organs examined not specified), and microscopic pathology (heart, lung, trachea, liver, pancreas, stomach, small intestine, colon, spleen, lymph node, kidney, urinary bladder, testis, ovary, prostate, uterus, pituitary, adrenal gland, salivary gland, thyroid gland, parathyroid gland, skeletal muscle, bone marrow, brain). No increase in mortality occurred and the only clinical signs were generalized inactivity and weakness in animals dying on study. A significant decrease in body weight gain was noted in the 1% dose group at the interim sacrifice (12 months) only. Body weights were also decreased in this group at the 12-month time

	point. After 24 months, no effect of treatment on body weight or body weight gain was observed. Food consumption was decreased in the high-dose group, but food utilization was unaffected. It was suggested that the body weight and food consumption effects were related to the palatability of the test diet. No effects on hematology, urinalysis, organ weights, and gross and microscopic pathology were reported. Reproductive organs (*i.e.*, testes, ovaries, uterus) showed no evidence of toxicity at any dose level. The tumor incidence and tumor types were similar in the test and control groups. Based on these data, it appears that the NOEL was 0.2% (approximately 200 mg/kg/day).
Data Quality	Valid without restriction – Klimisch Code 1b
References	Kay, J.H. 1962. Two-year chronic oral toxicity of [trade name deleted] hydrogenated rosin – albino rats. Industrial Bio-Test Laboratories, Inc., Northbrook, Illinois. World Health Organization (WHO). 1990. Principles for the Toxicological Assessment of Pesticide Residues in Food.